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APPLICATION NO	FIILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO
10/024,167	12/18/2001	Alfred E. Keller	1856-09501 (98/002)	5731

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[REDACTED] EXAMINER

VANOY, TIMOTHY C

ART UNIT	PAPER NUMBER
1754	13

DATE MAILED: 07/08/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	10/024,167	KELLER ET AL.
Examiner VANOY	Group Art Unit	
	1754	

— The MAILING DATE of this communication appears on the cover sheet beneath the correspondence address —

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE THREE MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, such period shall, by default, expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely, may reduce any earned patent term adjustment. See 37 CFR 1.704(b). A TIME LIMIT OF ONE MONTH IS SET TO CORRECT THE DEFICIENCIES OF THE 10 S.

Status

Responsive to communication(s) filed on 6/10/2003 AND 5/22/2003

This action is FINAL.

Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 1 1; 453 O.G. 213.

Disposition of Claims

Claim(s) 1-54 is/are pending in the application.
 Of the above claim(s) 1-9 AND 39-52 is/are withdrawn from consideration.

Claim(s) _____ is/are allowed.

Claim(s) 10-38, 53 AND 54 is/are rejected.

Claim(s) 28, 53 AND 54 is/are objected to.

Claim(s) 1-54 are subject to restriction or election requirement

Application Papers

The proposed drawing correction, filed on _____ is approved disapproved.

The drawing(s) filed on _____ is/are objected to by the Examiner

The specification is objected to by the Examiner.

The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119 (a)-(d)

Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119 (a)-(d).

All Some* None of the:

Certified copies of the priority documents have been received.

Certified copies of the priority documents have been received in Application No. _____.

Copies of the certified copies of the priority documents have been received
in this national stage application from the International Bureau (PCT Rule 17.2(a))

*Certified copies not received: _____.

Attachment(s)

Information Disclosure Statement(s), PTO-1449, Paper No(s). 4, 7 & 8 Interview Summary, PTO-413

Notice of Reference(s) Cited, PTO-892 Notice of Informal Patent Application, PTO-152

Notice of Draftsperson's Patent Drawing Review, PTO-948 Other _____

Office Action Summary

DETAILED ACTION

Election/Restrictions

The Applicants' election without traverse of claims 10-38, 53 and 54 in the election faxed on May 22, 2003 (paper no. 10) and also in the election faxed on June 9, 2003 (paper no. 12) is acknowledged.

Information Disclosure Statement

The information disclosure statement date-stamped July 23, 2002 does not fully comply with the requirements of 37 CFR 1.98 because the literature references by Watson et al. and Gamson et al. as well as the PCT search report PCT/US01/148795(?) are missing. Additionally, the information disclosure statement date-stamped Aug. 20, 2002 does not comply with the requirements of 37 CFR 1.98 because the PCT search report PCT/US00/34692 has not been supplied. Since the submission appears to be *bona fide*, applicant is given **ONE (1) MONTH** from the date of this notice to supply the above mentioned omissions or corrections in the information disclosure statement. NO EXTENSION OF THIS TIME LIMIT MAY BE GRANTED UNDER EITHER 37 CFR 1.136(a) OR (b). Failure to timely comply with this notice will result in the above mentioned information disclosure statement being placed in the application file with the noncomplying information **not** being considered. See 37 CFR 1.97(i).

Oath/Declaration

The oath or declaration is defective. A new oath or declaration in compliance with 37 CFR 1.67(a) identifying this application by application number and filing date is required. See MPEP §§ 602.01 and 602.02.

The oath or declaration is defective because the first page of the specification sets forth that this application is a continuation-in-part of 09-742,999 and also a continuation-in-part of 09-625,710. Therefore, the oath must mention that this application is a continuation-in-part of these two applications. A supplemental oath or declaration is required under 37 CFR 1.67. The new oath or declaration must properly identify the application of which it is to form a part, preferably by application number and filing date in the body of the oath or declaration. See MPEP §§ 602.01 and 602.02. Additionally, it would seem that the oath should also set forth that priority is also claimed of the parent applications 60-146,635 and 60-256,285.

Specification

- a) The status of the patent applications set forth on paragraph no.s 0001, 0045, 0047 and 0057 in the applicants' specification should be updated.
- b) The application information should be completed in paragraph no. 0056 in the applicants' specification.

Claim Objections

- a) In claim 28, Markush language should be used to recite the species of the "divided units".
- b) Claims 53 and 54 are objected to because they contain limitations drawn to a different invention for preparing a carbided device which does not further limit the claimed invention of desulfurizing the gas set forth in claim 10 and claims dependent

thereon. Further, the claim 39 set forth in claim 53 is a non-elected claim. Cancellation of claims 53 and 54 is suggested.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 10-38, 53 and 54 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-30 and 36-40 of copending Application No. 10-024,679. Although the conflicting claims are not identical, they are not patentably distinct from each other because the claims of 10-024,167 and 10-024,679 disclose obvious variations of the same method for removing hydrogen sulfide out of a gas by passing the hydrogen sulfide-containing gas together with an oxygen-containing gas through a millisecond catalytic reactor so that the hydrogen sulfide is oxidized by the oxygen to form elemental sulfur.

The difference between the claims of 10-024,679 and 10-024,167 is that the claims of 10-024,679 set forth that the hydrogen sulfide is removed from a hydrogen

sulfide-containing gas whereas the claims of 10-024,679 set forth that the hydrogen sulfide is removed from a hydrogen sulfide-containing waste gas stream, however it is submitted that this difference would have been obvious to one of ordinary skill in the art at the time the invention was made because it is submitted to be *prima facie* obvious that the processes of 10-024,267 and 10-024,679 can remove hydrogen sulfide out of any gas stream. Additionally, the "H₂S-containing gas stream" set forth in line 1 in claim 1 in 10-024,679 is broad enough to embrace the "H₂S-containing waste gas stream" of 10-024,167.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

The person having "ordinary skill in the art" has the capability of understanding the scientific and engineering principles applicable to the claimed invention. The references of record in this application reasonably reflect this level of skill.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. The Applicants are advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 10-12, 14-22, 24, 27-30, 35-38, 53 and 54 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 97/19019 in view of pgs. 457-460 in the Gas Purification reference by Kohl et al.

WO 97/19019 discloses a process for the oxidation of hydrogen sulfide into elemental sulfur by passing the hydrogen sulfide-contaminated gas (together with an oxygen-containing gas: please also see pg. 4 Ins. 1-12 in WO 97/19019) through a catalyst a variety of catalytic metals wherein the catalytic metals are supported on a silicon carbide support so that the catalyst promotes the oxidation of the hydrogen sulfide into elemental sulfur (please see the English abstract) at temperatures ranging from 30 to 1,000 °C (please also see pg. 6 Ins. 28-33 in WO 97/19019) and for a time period ranging from ½ second (500 milliseconds) to 20 seconds (please also see pg. 6

Ins. 10-14 in WO 97/19019), and then passing the gas through a condenser to condense the elemental sulfur out of the gas. The advantages of using a silicon carbide support are reported to be the resistance to sulfation and the avoidance of combustion (please see pg. 3 Ins. 23-26 in WO 97/19019). Claim 2 in WO 97/19019 mentions that a variety of transition metals may be used to promote the oxidation of the hydrogen sulfide into elemental sulfur, to include nickel, cobalt, iron, copper, silver, manganese, molybdenum, chromium, titanium, tungsten and vanadium. Pg. 2 Ins. 8-30 and pg. 4 Ins. 13-18 in WO 97/19019 gives examples of the catalytic metals that may be used to promote the oxidation of the hydrogen sulfide into elemental sulfur.

The difference between the applicants' claims and WO 97/19019 is that the claimed reaction temperature limitations overlap (for example, applicants' claim 11 sets forth that the reaction temperature ranges from 700 to 1,500 °C whereas pg. 6 Ins. 28-29 in WO 97/19019 report reaction temperatures ranging from 30 to 1,000 °C), *however* it is submitted that this difference would have been obvious to one of ordinary skill in the art at the time the invention was made *because* the courts have already determined that the overlapping portion of an applicants' claimed range and the corresponding range in a prior art reference is *prima facie* obvious: please see the discussion of the *In re Wertheim* 541 f.2d 257, 191 USPQ 90 court decision set forth in section 2144.05 in the MPEP (Feb. 2003).

The difference between the applicants' claim 1 and WO 97/19019 is that applicants' claim 1 describes the reactor as containing a gas mixing zone; a reaction zone and a cooling zone.

Fig. 8-16 on pg. 458 in the Gas Purification reference by Kohl et al. shows the same reactor lay-out for oxidizing hydrogen sulfide into elemental sulfur comprising the same zones of a hydrogen sulfide and air mixing zone; a reaction zone and a downstream cooling zone (please see the Thermal Stage).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made *to modify* the process described in WO 97/19019 *by substituting* the Thermal Stage lay-out illustrated in Fig. 8-16 on pg. 458 in the Gas Purification reference, *in lieu of* the reactor lay-out used for the process described in WO 97/19019, in the manner meeting the limitation ". . . reactor having a gas mixing zone, a reaction zone, and a cooling zone. . ." limitation set forth in the applicants' claim 10 lines 4 and 5, *because* it is obvious to use conventional and well-known reactor lay-out designs in lieu of newer reactor lay-out designs, consistent with the discussion of the court decisions set forth in section 2144.03 in the MPEP (Feb. 2003).

Claims 10-12 ad 14-38, 53 and 54 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 97/19019 in view of pgs. 457-460 in the Gas Purification reference by Kohl et al. as applied to claims 10-12, 14-24, 27-30, 35-38, 53 and 54 above, and further in view of U. S. Pat. 6,099,819.

The difference between the applicants' claims and WO 97/19019 is that applicants' claims 25, 26 and 31-34 call for the presence of a lanthanide-based metal (such as lanthanum or samarium) as the catalyst that promotes the oxidation of the hydrogen sulfide into elemental sulfur.

U. S. Pat. 6,099,819 discloses a similar process for the catalytic oxidation of hydrogen sulfide into elemental sulfur by passing the hydrogen sulfide-contaminated gas through a catalyst that may be selected from a variety of rare earth metals to include the La and Sm of the applicants' claims (please see col. 3 ln. 55 to col. 4 ln. 2 in U. S. Pat. 6,099,819).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made *to modify* the process resulting from WO 97/19019 in view of pgs. 457-460 in the Gas Purification reference by Kohl et al. *by including and/or using* lanthanide metals, such as the Sm and La, described in col. 3 ln. 55 to col. 4 ln. 2 in U. S. Pat. 6,099,819, in the manner required by at least applicants' claims 25, 26 and 31-34, *because* the disclosure set forth in col. 3 lns. 63-65 in U. S. Pat. 6,099,819 fairly suggests that these rare earth metal catalysts not only promote the oxidation of the hydrogen sulfide into elemental sulfur (in the manner required by the applicants' claims), but also have the advantage of avoiding poisoning by hydrogen sulfide.

Claim 13 has not been rejected under either 35USC102 or 35USC103 because pg. 6 lns. 10-14 in WO 97/19019 sets forth a minimum reaction time of $\frac{1}{2}$ second (i. e. 500 milliseconds), whereas claim 13 sets forth that the contact time is no more than 200 milliseconds.

The following references, which are indicative of the state of the art, are made of record:

Art Unit: 1754

U. S. Pat. 6,372,193 B1 disclosing a process for the oxidation of hydrogen sulfide using a catalyst containing a silicon carbide-based support;

U. S. Pat. 6,235,259 B1 disclosing a process for the oxidation of hydrogen sulfide into elemental sulfur;

U. S. Pat. 4,722,799 disclosing a process for desulfurizing natural gas, and

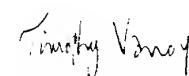
U. S. Pat. 4,197,277 disclosing a process for oxidizing sulfur compounds.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Timothy C. Vanoy whose telephone number is 703-308-2540. The examiner can normally be reached on 8 hr. days.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley Silverman, can be reached on 703-308-3837. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Timothy Vanoy/tv
July 1, 2003


Timothy Vanoy
Patent Examiner

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